

Date: November 15th, 2004**To:** State Assembly of New York Committee on Environmental Conservation**From:** Dr. Joseph Graney**Re:** Comments Concerning Vapor Phase Intrusion and Indoor Air Quality**Good afternoon!****Introduction**

I am an Associate Professor at Binghamton University. I come here today to express concern as well as discuss possible methods to better understand and rectify problems of vapor intrusion at Endicott, Hillcrest and other areas. As prior and following speakers will testify, vapor intrusion and indoor air quality issues are a growing area of concern in many communities. And with the increasing number of Superfund and brownfield sites that may have such problems, innovative solutions will be needed from engineering, health and economic perspectives, an area that the academic community may be able to contribute to in several ways.

My background includes a Ph.D. in Geology from the University of Michigan, followed by Postdoctoral work in the Air Quality Laboratory within the School of Public Health at the University of Michigan. I have been employed at Binghamton University since 1998. My research and teaching interests are in environmental geochemistry, specifically the processes involved in the emission, transport and deposition of metals. I have been fortunate to have been involved in some of the scientific research related to the Hillcrest problems. I have been impressed with how the local residents and community leaders at Hillcrest worked together to educate and learn from one another. And I note many of the same efforts by residents and community leaders in Endicott. The opportunity to learn from the experts composing today's panels has been beneficial for me in terms of clarifying issues and concerns from many perspectives. And I thank you for allowing me to add my thoughts and perspectives to this discussion.

Present Studies and Future Needs

In my opinion, the hydrogeology portion of the contaminant problem in Broome County from a groundwater contamination perspective is fairly well characterized in comparison to our present understanding of the vapor intrusion issues. Numerous studies by hydrogeologists from the United States Geological Survey (USGS) have laid a good foundation for study of the glacial deposits that contribute to the formation of aquifers and aquicludes in the southern tier of New York State. These physical examinations of subsurface materials as well as modeling scenarios

for contaminant transport were a good foundation for use by environmental consultants who have been working on the problems in Endicott and Hillcrest.

In contrast, the vapor intrusion component of the groundwater contamination problem is indeed in its infancy. The recent development of the sampling protocols for the proper analysis of contaminants in soil gas by the EPA has indeed allowed residents, regulators and research scientists to start to comprehend the potential severity of this emerging problem.

Much of my work at Hillcrest has been related to the emission and transport of vapor phase mercury. I believe that similarities in the chemical and physical properties of mercury to volatile organic compounds (VOCs) may allow findings from mercury monitoring studies to act as a potential surrogate for designing future studies of VOCs in brownfields as well as residential exposure studies.

The methods for detecting the indoor air concentrations of organic compounds such as trichloroethylene (TCE) and other VOCs typically require use of Summa canisters and relatively long sampling times (typically 24 hours). Collection and analysis of such samples is expensive, but needed for regulatory purposes including exposure assessments. However shorter term monitoring times and in-situ sampling methods would be of major benefit to better determine shorter term variation in VOC concentrations from exposure perspectives. Such instrumentation is available for monitoring low level mercury concentrations in indoor air exposure settings, and further development of similar instrumentation for low level VOCs is needed. Such instrumentation could be used to quickly screen large numbers of residences in a cost effective manner. Based on the results of my vapor phase mercury monitoring efforts, such short term monitoring yields better insights into the combined effects of temperature gradients, wind speed and velocity differences, and relative humidity gradients inside and outside of buildings that can not be ascertained by 24 hour sampling times.

The times of year when samples should be collected for indoor and ambient air exposure assessments need further study. I am also not convinced that the major indoor air exposure to contaminants associated with vapor intrusion occurs during the winter months (i.e. during the heating seasons when forced air furnaces are in operation). Sampling during all seasons should be carried out to document temporal trends in VOC concentrations specific to the climatic conditions in the Southern Tier of New York State.

The climatic and geologic conditions that produced the aquifers and river valley terrane that supply much of the drinking water in the southern tier of New York, may also make ambient air quality from venting of VOCs in residential communities a concern. Air quality monitoring and modeling in complex terrane (such as low elevations in the incised river valleys in contrast with the surrounding hillsops present in the southern Tier) will make accurate forecasts of pollutant transport versus accumulation a challenge. Due to the likelihood of pollutants in ambient air being preferentially channeled within the river valleys, I believe the direct venting of VOCs from the subsurface to ambient air outside of residences may be of concern. The present design of the residential ventilation systems (that seem to be the preferred remediation method for potential indoor air exposure) may be in operation for perpetuity. There must be a better engineering solution than emitting such vapors untreated to the atmosphere. The, at present, unknown

cumulative effects from such emissions from hundreds of residences should not be assumed to be of little long term concern without adequate study. Methods should be devised and tested to lower the VOC emissions to ambient air. For example, the installation of in-situ VOC vapor adsorption cartridges inside the ventilation ductwork may lower emissions to ambient air and be a solution to this potential long term problem.

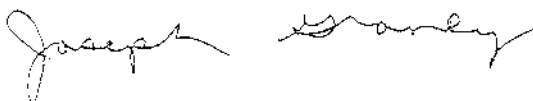
The groundwater contamination problems are proving to be difficult to rectify. There may be need for a further evaluation of innovative groundwater remediation approaches above and beyond conventional pump and treat methods. I am aware that some types of anaerobic microbial attenuation techniques are being considered, but have not seen a comprehensive list of other approaches that may be applicable. Elsewhere, subsurface use of permanganate or zero valent iron has shown some promise for breakdown of organic compounds. Phytoremediation of organic compounds such as TCE through use of poplar and willow trees also has the potential to attenuate pollutants and add beauty to affected neighborhoods. The study of preferential pathways of groundwater and vapor phase pollutant transport in relation to underground utility services (gas, sewer, cable, electric, telephone) is also in need of further study.

Opportunities

I am fortunate to be part of an ongoing independent research and assessment related to the pollution problems at Hillcrest. This independent assessment is taking place in consort with parallel conventional studies conducted by environmental consulting firms. I believe such independent studies are a good way to allow the expertise of university researchers and facilities (as well as students!) to be a part of the pollution solution process. Vapor intrusion and indoor air quality is an emerging issue. New York has the opportunity to take the national lead in dealing with these complex issues from all perspectives in Endicott, Hillcrest and elsewhere. Universities need to take a pro-active approach in helping to solve problems in their communities, many of us are willing to take part in this needed service. If needed, larger, integrated teams of university scientists could be assembled to tackle complex independent assessments at locations such as Endicott. Assembling such a team may need to include environmental engineers, economists, hydrogeologists, toxicologists, environmental geochemists, analytical chemists, political scientists, as well as education and communication experts, a task that would be challenging, but not insurmountable! However, some type of innovative financing mechanism may be needed to allow such a university based independent assessment team to be formed and succeed, in consort with ongoing studies by corporation and state and federal agencies.

I believe there are economic opportunities for job growth associated with vapor phase intrusion issues that are applicable for redevelopment of brownfields sites. Development of in-situ, real time instruments for screening of pollutant concentrations, design and retrofitting of residential ventilation systems that will remove contaminants prior to emission to ambient air, and further work on phytoremediation from a pollutant removal and project beautification perspective, are just a few areas that have promise for applications on brownfields sites here and elsewhere.

Thank you for the opportunity to share my concerns and perspectives.

Handwritten signature of Joseph Stanley in cursive script.